

Solving discrete problems — Math 2020, Spring 2005

Quiz, Thursday 27 January

Let a, b, c be positive integers.

Let P be the statement “ c divides a ”,

let Q be the statement “ c divides b ”,

let R be the statement “ $a = cr$ for some positive integer r ”

let S be the statement “ $b = cs$ for some positive integer s ”

let T be the statement “ $(a + b) = c(r + s)$ for some positive integers r and s ”

let U be the statement “ $(a - b) = c(r - s)$ for some positive integers r and s ”

let V be the statement “ $a + b$ is divisible by c ”

let W be the statement “ $a - b$ is divisible by c ”

Now write each of the following in symbolic notation, using the above symbols for each statement, and the connectives

$\neg, \wedge, \vee, \rightarrow, \leftrightarrow$.

If c divides a then $a = cr$ for some positive integer r

If c divides b then $b = cs$ for some positive integer s

If $a = cr$ and $b = cs$ for some positive integers r, s , then $a + b = c(r + s)$

If $a = cr$ and $b = cs$ for some positive integers r, s , then $a - b = c(r - s)$

If $a + b = c(r + s)$ for some positive integers r, s , then $a + b$ is divisible by c

If $a - b = c(r - s)$ for some positive integers r, s , then $a - b$ is divisible by c

If a is divisible by c , and b is not divisible by c , then $a + b$ is not divisible by c .

If $a + b$ is not divisible by c then either a and b are both divisible by c , or they are both not divisible by c